

Hepatitis C an ample viral infection in Pakistan: Prevalence, Risk Factors, and Public Health Challenges

Azka Nasir, Rabia Maham* and Faiza Sakhawat

Institute of Microbiology, University of Agriculture Faisalabad, Pakistan

*Corresponding Author: rabiamaaham49@gmail.com

ABSTRACT

Infection cause by Hepatitis C virus is a significant concern for health across the world and represents a serious issue for public health, particularly in developing nations like Pakistan. With approximately 8 million to 11 million people (which is roughly double the population of Arizona) experiencing active HCV viremia, Pakistan has the second highest burden of HCV worldwide, along with 240,000 new infections annually. A considerable portion of the population in Pakistan lives with chronic HCV, and many of these individuals go on to develop cirrhosis and liver cancer. Several crucial factors, namely injection drug users and accidental puncture with infected needles are identified as contributing to Hepatitis C. RT-PCR provides diagnosis that is more sensitive and specific than serological testing, allowing for prompt and focused interventions. One characteristic complicating treatment is the variability of the virus. The article offers a comprehensive analysis of the prevalence of different genotypes and emphasizes the significance of efficient treatment.

Keywords: Hepatitis C, Risk factor, Genotype, Prevalence

To cite this article: Nasir A, R Maham & F Sakhawat. Hepatitis C an ample viral infection in Pakistan: Prevalence, Risk Factors, and Public Health Challenges. *Biological Times*. 2024 December 3(12): 1-3.

Introduction

Hepatitis C is a liver condition that can vary in severity, ranging from a short episode of moderate sickness to a severe, life-threatening illness [1]. HCV is a member of Flaviviridae family and has a genome that is around 9.6 kilobases long, consisting of single-stranded, positive-sense RNA [2]. A significant number of individuals infected with hepatitis C may go on to develop a chronic infection that can result in cirrhosis, hepatocellular carcinoma, and chronic liver disease (HCC). The transition from acute to chronic hepatitis C frequently happens without any prominent symptoms [3].

The progression of chronic hepatitis C can vary among different individuals. For 25 to 30 years, it is projected that 20% to 25% of those affected may develop cirrhosis. A range of host, viral, and environmental factors influence the speed of disease progression. The rate at which numerous viral and environmental elements impact the disease advances and represents one of the greatest global burdens of viral hepatitis [4]. The National Hepatitis Survey shows that about 8 million Pakistanis have been diagnosed with HCV. Most individuals who have HCV virus are not aware that they are affected. Both diagnosis and therapy are delayed as a result of this situation. In a nation with limited resources like Pakistan, a delayed diagnosis can result in consequences including cirrhosis, decompensated chronic liver disease, and hepatocellular carcinoma, which escalates the disease burden [5]. The development of direct-acting antiviral drugs (DAA) has been an important breakthrough in the treatment of HCV infection in recent times [6]. The primary preventive measures should focus on developing a safer blood supply in developing nations, promoting safe injection procedures in healthcare and other settings, and lowering the number of people who begin taking injectable medicines because there is no vaccine or post-exposure prophylaxis for HCV [7].

Factors

HCV is a significant global health threat, progressing to chronic liver disease in 50–80% of cases and potentially leading to cirrhosis. Patients with cirrhosis and hepatocellular carcinoma may require liver transplants. Approximately 2.5 million people die each year due to HCV. In Pakistan, the estimated prevalence of HCV is between 2.4% and 6.5% [8]. Socio-demographic factors, such as being over 35 years old, receiving shaves at barbershops, and undergoing dental procedures, have been identified as risk factors for the spread of both HCV and HBV. Among conventional transmission routes, blood cupping (hijama) has emerged as a notably significant risk for both HCV and HBV [9]. Hepatitis C virus is primarily transmitted when an individual comes into contact with the blood from an infected individual. This is often observed when people share drug injection tools. Currently, the majority of hepatitis C cases stem from the sharing of needles, syringes, or other equipment used to prepare and inject substances. Childbirth also plays a role in transmission, as approximately 6% of infants born to mothers with the virus may acquire hepatitis C. Though less common, exposure in healthcare settings can also result in infection if medical staff do not follow appropriate protocols to prevent the spread of blood-borne pathogens. Additionally, sexual transmission of hepatitis C can

occur, particularly among men engaging in sexual activities with other men. Before the implementation of broader blood donation screening in 1992, additionally, organ donation and blood transfusions were ways that hepatitis C was transmitted [10].

Major hepatitis C risk factors include

- Use of intravenous drugs
- Blood transfusions received prior to 1992
- Accidental exposure to infected needles
- Transmission from mother to child during childbirth
- Hemophilia
- Hemodialysis treatments
- Organ transplants performed before 1992.

Minor hepatitis C risk factors include

- Use of intranasal cocaine
- Body piercings
- Tattooing
- Sharing of shaving tools
- Sexual encounters
- Injuries to boxer's knuckles
- Transmission from healthcare providers to patient [11].

Injection drug users (IDUs)

There are around 500,000 heroin users in Pakistan, according to the 2000 National Assessment Study of Drug Use in Pakistan, which received funding by the United Nations Office on Drugs and Crime (UNODC). Of these instances, 75,000 (15%) are classified as regular intravenous drug users (IDUs), and 150,000 (30%) are classified as occasional IDUs. There is a dearth of research on the health concerns that this important high-risk group faces; a 2003 study found that the prevalence of HCV among IDUs in Lahore, Punjab, was 93%, and in Quetta, Balochistan, it was 75%. Additionally, a smaller study conducted out in 2004 revealed that among IDUs in Quetta, the prevalence of HBV, HCV, and HIV was 6%, 60%, and 24%, respectively [12].

In terms of injection usage, the occurrence of anti-HCV was notably elevated among individuals who had used injections, regardless of gender, when compared to non-users. A similar distinction was observed in both genders among the varying levels of injection users. Furthermore, anti-HCV levels were significantly elevated in individuals who had used reused syringes compared to those without any injection history, while no significant difference was noted between non-users and those who utilized new disposable syringes [13].

Prevalence

HCV is divided into 7 genotypes and 67 subtypes due to genetic diversity [15]. In The most common genotypes in Pakistan are 3a and 3b, which are later followed by 1a, 2a, and untypable. While the vast majority of patients in Baluchistan were discovered to be infected with genotypes 1a and 2a, genotypes 3a and 3b were found to be the most prevalent in the provinces of KPK, Punjab, and Sindh [16]. The six primary clinical HCV genotypes, genotype 3 account for 22–30% of all infections and are recognized as a

distinct category associated with increased steatosis rates, quicker advancement to cirrhosis, and elevated occurrences of hepatocellular carcinoma [17].

HCV is an RNA virus characterized by a significant mutation rate. This elevated mutation frequency leads to considerable genetic diversity, with HCV isolates appearing as either quasispecies or genotypes. Humans can be co-infected with multiple genotypes (mixed genotype infections) of this virus. The prevalence of mixed-genotype infections in HCV varies significantly across different regions and among the same patient group tested using various assays [18].

A total of 3,539 samples that tested positive for HCV were typed between 2015 and 2019. The frequency distribution of different viral genotypes and subtypes was determined and evaluated among 3,539 samples that tested positive for HCV between 2015 and 2019. Of these, 1,930 (54.37%) were female, and 1,609 (45.62%) were male. The most common genotype found was 3a, which considered 3,060 cases (87%), followed by an untypable genotype (254 cases, 7.17%), genotype 1a (136 cases, 3.84%), and genotype 3b (37 cases, 1.04%). Co-infection with different genotypes represented 0.67% of the total infected population [19].

Discussion

With a 3.5% fatality rate, Liver cirrhosis is the eleventh most prevalent cause of mortality and liver cancer is the sixteenth leading cause [23].

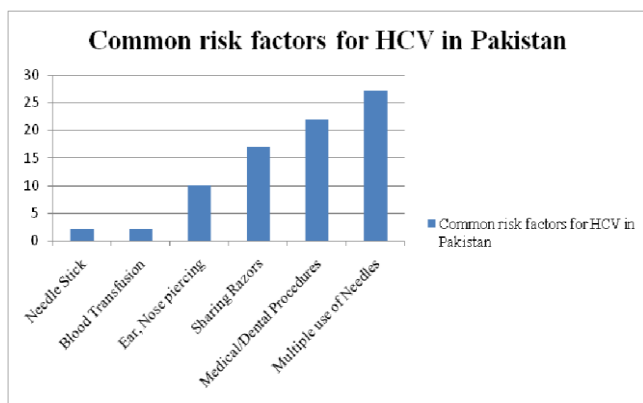


Fig. 1: Common risk factors for HCV in Pakistan [14]

Pakistan is facing a significant HCV epidemic, with one in every 20 individuals infected. The primary mode of transmission seems to stem from healthcare-related practices [24]. Additional approaches to managing genotype 3a need to be acknowledged. Strategies are implemented to minimize the risk factors associated with this widely occurring illness. There is an urgent need to expand HCV treatment and prevention efforts.

Understanding genotyping could play a crucial role in the future development of community-based vaccines. Additionally, it is recommended that blood screening for transfusions be mandated to enhance safety for recipients. Moreover, research has shown that molecular diagnosis of HCV through RT-PCR is a more effective, specific, and sensitive method compared to serological testing, particularly for early detection and for cases that have resolved in the past [25].

Chronic HCV is now mostly curable owing to recent advancements in therapy. Simple, well-tolerated options for therapy coupled with improved HCV diagnosis ought to decrease the need for liver transplants and the disease's mortality rates. Sofosbuvir plus pegylated interferon and ribavirin have significantly shown to be beneficial for treating patients with HCV genotype 1; however, patients with HCV genotypes 2 and 3 should only take sofosbuvir and ribavirin. Further research will be required in order to fully comprehend the effectiveness of sofosbuvir and simeprevir in patients with HIV-HCV coinfection. A clinical specialist should treat patients using both HIV and HCV [26].

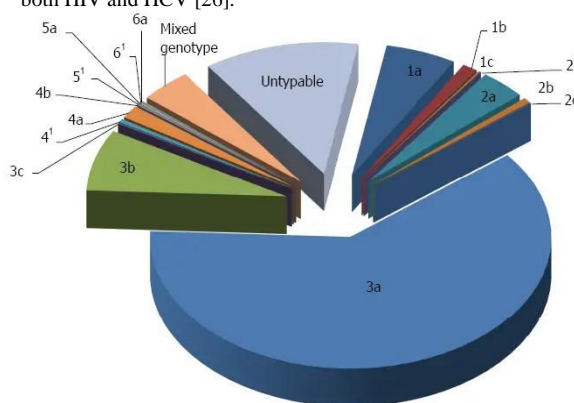


Fig. 2: Distribution of relative frequencies of hepatitis C virus subtypes in Pakistan [20]

Table 1. Distribution of Hepatitis C Virus Genotypes in Punjab (2015–2019)

Year	Gender	Age average – (SD)	Genotype (N)										Total	
			1a	1b	2a	2b	3a	3b	3c	4a	Mixed	Untypable		
2018	Male	44–12.04	2	—	—	—	21	—	—	—	—	—	—	23
	Female	42–14.78	3	—	—	—	33	—	—	—	—	—	36	
	Total	43–13.80	5	—	—	—	54	—	—	—	—	—	59	
2019	Male	42.25–14.23	3	—	—	—	29	—	—	—	—	8	40	
	Female	40.26–13.35	—	—	—	—	46	—	—	—	—	14	60	
	Total	41.05–13.82	3	—	—	—	75	—	—	—	—	22	100	

SD: standard deviation [22]

Average prevalence of HCV in the general population mean HCV prevalence in the general population

The pooled mean considering a mean HCV prevalence rate of 7.0% (95% CI: 5.8–8.3%), Sindh had the highest pooled estimates. Islamabad Capital Territory came in second place with 6.9% (95% CI: 2.6–13.0%), Khyber Pakhtunkhwa with 6.6% (95% CI: 5.6–7.7%), Azad Kashmir with 5.8% (95% CI: 4.5–7.1%), Balochistan with 5.8% (95% CI: 2.9–9.5%), Punjab with 5.6% (95% CI: 4.5–6.8%), F.A.T.A. at 0.9% (95% CI: 0.1–2.4%). On the whole, Pakistan's pooled mean was 6.1% (96% CI: 5.5–6.7%) [21]. Another study shows HCV prevalence in Punjab from 2015 to 2019 which is shown in table 1.

References

[1] Organization WH. Recommendations and guidance on hepatitis C virus self-testing: World Health Organization; 2021 (online).
 [2] Shenge J, Odaibo G, Olaleye D. Genetic diversity of hepatitis C virus among blood donors and patients with clinical hepatitis in Ibadan, Nigeria. Archives of basic and applied medicine. 2018;6(1):79.
 [3] Lingala S, Ghany MG. Natural history of hepatitis C. Gastroenterology Clinics. 2015;44(4):717-34 https://doi.org/10.1016/j.gtc.2015.07.003.
 [4] Westbrook RH, Dusheiko G. Natural history of hepatitis C. Journal of hepatology. 2014;61(1):S58-S68. https://doi.org/10.1016/j.jhep.2014.07.012.
 [5] Mahmood H, Raja R. Risk factors of hepatitis C in Pakistan. Gastroenterol Hepatol Open Access. 2017;7(6):00259 https://doi.org/10.15406/ghoa.2017.07.00259.

[6] Yilmaz H, Yilmaz EM, Leblebicioglu H. Barriers to access to hepatitis C treatment. The Journal of Infection in Developing Countries. 2016;10(04):308-16 https://doi.org/10.3855/jidc.7849.
 [7] Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. The Lancet infectious diseases. 2005;5(9):558-67 https://doi.org/10.1016/S1473-3099(05)70216-4.
 [8] Rathore JA, Shah MA, Mehraj A. Hepatitis C virus transmission risk factors. Journal of Ayub Medical College Abbottabad. 2012;24(3-4):106-8 http://www.ayubmed.edu.pk/JAMC/24-3/Rathore.pdf.
 [9] Naqvi IH, Talib A, Baloch G, Mahmood K, Qadari Z. Hepatitis B and C: frequency, modes of transmission and risk factors along with some unorthodox routes of spread. Pakistan Journal of Public Health. 2019;9(3):161-5 https://doi.org/10.32413/pjph.v9i3.273.
 [10] Waheed Y, Saeed U, Safi SZ, Chaudhry WN, Qadri I. Awareness and risk factors associated with barbers in transmission of hepatitis B and C from Pakistani population: barber's role in viral transmission. Asian Biomedicine. 2010;4(3):435-42. https://doi.org/10.2478/abm-010-0053.
 [11] Villena EZ. Module I Transmission routes of hepatitis C virus infection. Annals of Hepatology. 2006;5(S1):12-4. https://doi.org/0.1016/s665-2681(19)31961-1.
 [12] Ali SA, Donahue RM, Qureshi H, Vermund SH. Hepatitis B and hepatitis C in Pakistan: prevalence and risk factors. International journal of infectious diseases. 2009;13(1):9-19 https://doi.org/10.1016/j.ijid.2008.06.019.
 [13] Qureshi H, Bile K, Jooma R, Alam S, Afrid H. Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measures. EMHJ-Eastern Mediterranean Health Journal, 16 (Supp), 15-23, 2010. https://iriswho.int/handle/10665/118014. 2010.
 [14] Mahmood H, Raja R. Risk Factors of Hepatitis C in Pakistan. Gastroenterol Hepatol Open Access. 2017;7(6):00259DOI:10.15406/ghoa.2017.07.00259.
 [15] Qamar Z, Anwar F, Ahmad R, Haq I, Khan AMK, Hussain R, et al. Prevalence of Hepatitis C virus and determination of its genotypes in subjects of Tehsil Daggard District Buner, KP.

- Pakistan. *Clinical Epidemiology and Global Health*. 2021; 12:100809 <https://doi.org/10.1016/j.cegh.2021>.
- [16] Attaullah S, Khan S, Ali I. Hepatitis C virus genotypes in Pakistan: a systemic review. *Virology journal*. 2011; 8:1-6 [10.1186/743-422X-8-433](https://doi.org/10.1186/743-422X-8-433).
- [17] Chan A, Patel K, Naggie S. Genotype 3 infection: the last stand of hepatitis C virus. *Drugs*. 2017; 77:131-44 DOI [10.1007/s40265-016-0685-x](https://doi.org/10.1007/s40265-016-0685-x).
- [18] Falcone V, Ridder GJ, Panning M, Bierbaum S, Neumann-Haefelin D, Huzly D. Human bocavirus DNA in paranasal sinus mucosa. *Emerging Infectious Diseases*. 2011;17(8):1564 <https://doi.org/10.3201/eid1708.101944>.
- [19] Haqqi A, Munir R, Khalid M, Khurram M, Zaid M, Ali M, et al. Prevalence of hepatitis C virus genotypes in Pakistan: current scenario and review of literature. *Viral immunology*. 2019;32(9):402-13 doi/full/[10.1089/vim.2019.0058](https://doi.org/10.1089/vim.2019.0058).
- [20] Muhammad Umer MU, Mazhar Iqbal MI. Hepatitis C virus prevalence and genotype distribution in Pakistan: comprehensive review of recent data. 2016: doi: [10.3748/wjg.v22.i4.1684](https://doi.org/10.3748/wjg.v22.i4.1684).
- [21] Mahmud S, Al Kanaani Z, Abu-Raddad LJ. Characterization of the hepatitis C virus epidemic in Pakistan. *BMC infectious diseases*. 2019; 19:1-11 <https://doi.org/10.1186/s12879-019-4403-7>.
- [22] Haqqi A, Munir R, Khalid M, Khurram M, Zaid M, Ali M, et al. Prevalence of Hepatitis C Virus Genotypes in Pakistan: Current Scenario and Review of Literature. *Viral immunology*. 2019;32(9):402-13 doi: [10.1089/vim.2019.0058](https://doi.org/10.1089/vim.2019.0058).
- [23] Qamar Z, Anwar F, Ahmad R, Haq I, haq M, Kashif Khan AM, et al. Prevalence of hepatitis C virus and determination of its genotypes in subjects of Tehsil Daggar District Buner, KP, Pakistan. 2021.
- [24] Al Kanaani Z, Mahmud S, Kouyoumjian SP, Abu-Raddad LJ. The epidemiology of hepatitis C virus in Pakistan: systematic review and meta-analyses. *Royal Society open science*. 2018;5(4):180257 <https://doi.org/10.1098/rsos.2018.0540>.
- [25] Umer M, Iqbal M. Hepatitis C virus prevalence and genotype distribution in Pakistan: Comprehensive review of recent data. *World journal of gastroenterology*. 2016;22(4):1684. <http://doi.org/10.3748/wjg.v22.i4.1684>.
- [26] Ahmad N, Asgher M, Shafique M, Qureshi JA. An evidence of high prevalence of Hepatitis C virus in Faisalabad, Pakistan. *Saudi medical journal*. 2007;28(3):390t: <https://www.researchgate.net/publication/271329075>.